HUMAN PARVOVIRUS B19 INFECTION

An Autoimmune Disease Trigger

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Human Parvovirus B19 has been linked to a number of different autoimmune diseases, including vasculitis and connective tissue disorders.

The Virus

Human Parvovirus B19, a species of parvovirus that infects humans, is associated with the development of several different autoimmune diseases including dematomyositis, mixed connective tissue diseases, a lupus-like illness, a serologically negative (negative RA factor test) form of arthritis, granuloma annulare, autoimmune thyroid disease, autoimmune schizophrenia, and various forms of vasculitis, including Henoch Schonlein purpura, Kawasaki disease, Wegener’s granulomatosis, and polyarteritis nodosa.

The development of autoimmune conditions following Human Parvovirus B19 occurs in people of all ages and occurs more frequently in females. Autoimmune disease development is also known to occur in adults exposed to children with fifth disease.

Human Parvovirus B19 Disease

Human Parvovirus B19 was first identified in 1975. Since its identification, this viral agent has been recognized as the cause of “fifth disease” in children and adults. Infection with Human Parvovirus B19 is characterized by a petechial (causing small bruise-like eruptions) rash similar to the skin lesions seen in Sweet’s syndrome or erythema multiforme. This rash occurs in a “glove and stocking” distribution in the pattern of a lace-like or reticular rash covering the trunk; another finding is a characteristic reddening of the cheeks referred to as a “slapped cheek” sign. Other symptoms of infection include a systemic lupus-like syndrome of arthritis, edema, mucosal ulcers of the mouth and/or genital tract, uveitis, fever, joint pain, muscle weakness, and purpura or bruising of the lower extremities.

Diagnosis

Human Parvovirus B19 infection is diagnosed by serological tests for Human Parvovirus B19 antibodies. In addition, the lesions in Human Parvovirus B19 infection show evidence of the parvovirus B19 genome and can be used to diagnose infection. Skin biopsies of infection patients also show an infiltration of white blood cells, fragmented collagen, and vascular changes. Besides the links to autoimmune disease, Human Parvovirus 19 infection is thought to be responsible for fetal loss in pregnancy and for aplastic anemia in patients with compromised immune systems, including patients on immunosuppressant medications.
In chronic infection, Human Parvovirus B19 can infect the brain. Because of its ability to induce autoimmunity, this virus is suspected of triggering co-morbid bipolar and autoimmune thyroid disorders in females and schizophrenia and autoimmune thyroid disorders in males.

The Autoimmune Connection

The skin manifestations in Parvovirus B19 suggest a type of tissue injury that is mediated by a delayed-type hypersensitivity in which antibodies to Parvovirus B19 go on to target persistent Parvovirus antigens in the skin tissue, causing immune complex formation. The immune response in Parvovirus infection also causes the induction of tumor necrosis factor alpha (TNF-α), a cytokine involved in the development of ANCA positive vasculitis syndromes.

Researchers at Ohio State University have also found a series of patients with interstitial lung disease, including pulmonary fibrosis, with evidence of chronic Parvovirus B19 infection based on the presence of parvovirus antibodies and the isolation of Parvovirus B19 DNA in lung tissue samples.

One major theory of autoimmune disease development involves the presence of superantigens, which include various protein particles that are capable of reacting with multiple cell receptors. Through a process of molecular mimicry, viral superantigens can elicit an autoimmune response in which the immune system targets specific bodily proteins rather than the infectious agent.

Other infectious agents known to cause a “reactive” form of arthritis and rash because of their ability to act as superantigens include cytomegalovirus, streptococcus, mycoplasma, Klebsiella, and Borrelia burgdorferi.

Treatment

Treatment for connective tissue diseases and other autoimmune conditions suspected of being triggered by chronic Human Parvovirus B19 infection include immunosuppressive and immunomodulatory therapy with agents including prednisone, cyclophosphamide, hydroxychloroquine, non-steroidal anti-inflammatory drugs and etanercept. However, none of these therapies have caused a complete resolution of symptoms.

Resources:


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